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Growth and Fruiting of Nectaried and Nectariless Cotton

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ABSTRACT

The growth and development of two nectaried and two nectariless cultivars and one advanced nectariless breeding stock of 'Deltapine' and 'Stoneville' cotton, *Gossypium hirsutum* L., were observed at Tempe, Ariz., in 1976 to obtain validation data for crop simulation models. Counts of the number of plant parts and their weights are presented along with daily weather data. 'Stoneville 731N' nectariless cotton produced more bolls and squares and appeared to have a slightly more robust growth habit than the other four cultivars as judged from dry weights of plant parts. The two nectariless cultivars, however, were similar enough in their growth and development to the nectaried cultivars to have little effect on the predictive power of cotton growth-simulation models.

KEYWORDS: Cotton, *Gossypium*, growth, simulation, stem nodes, squares, bolls, leaves, cotton yield, plant height, nectaried cotton, nectariless cotton.

A free copy of this publication is available from the Western Cotton Research Laboratory, 4235 East Broadway Road, Phoenix, Ariz. 85040.

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GROWTH AND FRUITING OF NECTARIED AND NECTARILESS COTTON

By G. D. Butler, Jr., T. J. Henneberry, and F. D. Wilson¹

INTRODUCTION

Strains of cotton, *Gossypium hirsutum* L., lacking extrafloral nectaries are potentially important in cotton pest management systems because the nectariless character has a deleterious effect on several cotton insects (4, 5, 6, 9, 11).² Certain nectariless cultivars and advanced breeding stocks are similar in yielding ability, other agronomic characters, and fiber properties to the widely adapted nectaried cultivars in 'Deltapine' and 'Stoneville' (8). Thus, producers should be able to grow nectariless cultivars without changing their cultural practices except possibly to reduce the amount of insecticide used for certain insects; however, there may be subtle differences in the growth and fruiting of nectariless cottons that are unappreciated. These differences may not affect production practices as much as they may affect the predictive power of cotton growth-simulation models (2, 3, 7, 10), which are based on data from nectaried cottons. Therefore, nectariless and nectaried cottons were grown together in replicated plots to generate data that may refine the models.

This bulletin presents growth and development data on Deltapine and Stoneville nectaried and nectariless cultivars and strains grown at the Arizona State University (ASU) Farm Laboratory, Tempe, in 1976, in plots that received no insecticide treatment.

METHODS AND MATERIALS

Four cotton cultivars, 'Deltapine 16' (DPL-16), 'Stoneville 213' (St 213), 'Stoneville 731N' nectariless (St 731N), 'Deltapine 61' (DPL-61), and one advanced breeding stock, Deltapine 7146N nectariless (DPL-7146N) were planted in four randomized blocks on April 10, 1976, at the ASU Farm Laboratory. The soil type was contine clay loam (1). The seeds were planted 5 cm deep in rows one meter apart. Each plot was 12 rows wide and about 9 m long.

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² Italic numbers in parentheses refer to Literature Cited, p. 3.

Data obtained from plants growing in the field were as follows: (1) Number of seedlings germinating per row (counted at intervals, April 28 to May 6); (2) number of plants per one meter of row at 10 locations per plot, June 14; (3) number of plants per 4.8 m (0.0004 ha) of row at six locations per plot, August 16 to 18; (4) height, in centimeters, of 10 plants per plot at weekly intervals, May 17 to August 9; and (5) distance, in centimeters, between plant canopies in adjacent rows, 10 plants per plot, at intervals, July 12 to August 9.

At weekly intervals, beginning May 17, five plants per plot were dug with a shovel. The following data were obtained: (1) Number of main stem nodes; (2) node of first square (flowerbud); (3) number of squares per plant; (4) number of missing squares; (5) number of small bolls (<1.25 cm diam); (6) number of large bolls (>1.25 cm diam); (7) number of missing bolls.

The following dry weights in grams were recorded for plant material that had been dried in an oven for at least one week at about 71°C: (1) Leaves and stems plus roots, May 17 to August 2; (2) squares, small bolls, large bolls, and open bolls, June 7 to August 23. Total plant dry weight was calculated as the sum of all the component parts.

The increase in weight of individual bottom bolls during midseason was determined by, first, tagging flowers at 2- to 3-day intervals, June 30 to July 31, then, harvesting bolls on August 12, 14 to 43 days after flowering. Harvest weight of individual bolls was determined by harvesting one sample per plot of 25 fully fluffed bolls on October 4 and two samples per plot on November 4. Each 25-boll sample was dried in an oven for one month, then weighed. The seed cotton was removed and weighed, and the burs were weighed. The seed and lint weights were determined after the seed cotton had been ginned.

A weekly harvest was made of all the open bolls on 4 m of row in each plot. The number of bolls harvested and the weight of the harvested seed cotton were determined.

Maximum and minimum temperatures were obtained from January 1 to March 1 at the Cotton Research Center, Phoenix, Ariz., about 10 miles northwest of the ASU Farm Laboratory. From March 10 to May 9, maximum and minimum temperatures with 3 p.m. relative humidities were obtained in an alfalfa field at the ASU Farm Laboratory. On May 10, a thermograph was placed in the cottonfield. Average wind velocities were obtained from a Belfort® totalizing anemometer, and a rain gage was observed daily. The number of langleys of solar radiation per day was obtained from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service at Sky Harbor International Airport, Phoenix, about 15 miles northwest of the ASU Farm Laboratory.

RESULTS

Seedling emergence reached 50 percent during the period from May 2 to 4, with seeds of DPL-16 and St 213 emerging on May 2, DPL-7146N on May 3, and St 731N and DPL-61 on May 4.

The patterns of plant growth of all cultivars in the experiment were sim-

ilar in terms of plant height (table 1),³ number of main stem nodes (table 2), and node of the first square (table 3). The numbers of plant parts present on different dates are given in tables 4, 5, and 6. There were few significant differences between the different cultivars tested in any of these observations; however, St 731N had more squares (table 4) and bolls (tables 5 and 6), and the rate of squaring and boll production appeared higher than in other cultivars in the experiment. This was not expressed in a yield difference because the weight of cotton per boll was less.

Square and boll shed were similar in all cultivars at all dates sampled (table 7 and 8). The average percentage of missing squares was 8 percent during June for all cultivars. It decreased in early July to 5 percent and then increased at a uniform rate to 7, 9, 15, 21, 58, and 72 percent on the sampling dates from July 12 to August 23, respectively. The percentage of missing bolls for all cultivars averaged 26 percent during July. Percentages in August were 36, 38, 52, and 59 percent on the four sample dates, respectively.

Weights of various plant parts (table 9, 10, 11, 12, 13, and 14) were also similar (slightly higher in St 731N), as were average boll weights at intervals after flowering up to 43 days (table 15). Samples of St 731N and DPL-61 bolls picked at maturity tended to have lower seed and lint weight (table 16); however, total seed cotton weights at harvest were comparable in all cultivars except in DPL-61, which was lower (table 17 and 18).

Weather data that might be useful in computer programs to simulate cotton plant growth are given in table 19 and include maximum and minimum temperatures, relative humidity, number of langleys, and the amount of rain or irrigation.

CONCLUSIONS

Our data show that growth-simulation patterns are similar for the nectariless and nectaried cottons included in our tests. Thus, the predictive power of cotton growth-simulation models should be comparable for all five cultivars.

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APPENDIX

TABLE 1.--*Mean plant height in centimeters*¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
May 17	7.4	7.8	7.7	7.8	7.3	N.S. ²
	24	11.8	11.9	11.8	11.2	N.S.
June 1	15.4	15.8	15.5	15.7	14.9	N.S.
	7	20.8 a	21.3 a	20.4 ab	21.2 a	19.8 b * ³
14	28.2	27.5	27.6	27.2	25.4	N.S.
	21	38.4 a	36.9 ab	39.2 a	38.6 a	35.8 b *
28	51.4	48.1	50.7	51.0	47.4	N.S.
	July 6	65.2	61.8	64.0	63.4	62.2
12	73.1	68.4	72.1	71.1	69.2	N.S.
	19	88.3	82.8	86.7	84.9	86.0
26	96.2	91.4	97.4	95.3	97.5	N.S.
	Aug. 2	103.1	97.0	105.4	103.2	106.6
9	109.9	102.2	111.8	109.4	113.6	N.S.

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 2.--*Mean number of main stem nodes*¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
May 24	7.0 ab	7.0 ab	7.3 a	6.6 b	6.6 b	* ²
	31	9.4 a	8.9 ab	9.2 a	8.6 b	9.4 a *
June 7	11.6 ab	11.6 a	11.6 a	10.8 c	11.0 bc	*
	14	14.0	13.8	14.6	13.1	13.8 N.S. ³
21	16.8	16.2	16.9	16.2	16.1	N.S.
	28	18.6	19.0	19.3	18.6	19.0 N.S.
July 6	21.8	21.2	21.9	20.7	21.8	N.S.
	12	23.6	22.8	23.4	22.6	N.S.
19	25.3	24.6	24.4	23.4	25.4	N.S.
	26	26.7	25.4	27.4	25.6	28.0 N.S.
Aug. 2	27.0 b	26.8 b	29.0 ab	27.6 ab	29.6 a ** ⁴	
	9	29.2	27.1	28.4	28.7	29.6 N.S.
16	29.6	27.4	29.2	28.6	29.6	N.S.
	23	29.4	28.8	29.5	28.6	30.0 N.S.

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²0.05 level of probability.

³No statistically significant differences.

⁴0.01 level of probability.

TABLE 3.--Mean plant node of first square¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
June 7 ²	8.4	8.8	8.8	8.2	8.4	N.S. ³
	14	8.8	9.1	9.0	8.5	N.S.
	21	8.6 b	9.4 a	9.0 ab	8.8 b	* ⁴

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²Only 70 of 100 plants with squares.

³No statistically significant differences.

⁴0.05 level of probability.

TABLE 4.--Mean number of squares¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
June 14	8.6	7.2	8.7	6.0	7.6	N.S. ²
	21	18.2	19.0	18.4	14.2	N.S.
	28	21.2	24.0	30.2	24.4	N.S.
July 6	46.8 ab	38.5 b	44.6 ab	60.5 a	32.4 b	*** ³
	12	43.3	46.0	59.9	42.4	N.S.
	19	50.0	52.4	60.4	56.3	N.S.
Aug. 2	36.2 b	40.4 b	54.4 ab	70.4 a	46.0 b	**
	9	24.8	30.8	45.2	43.2	N.S.
	16	32.5 b	25.7 b	48.7 a	34.2 b	* ⁴
23	10.2 b	6.6 b	12.2 b	21.4 a	12.0 b	*
	4.8	4.1	6.2	5.2	6.7	N.S.

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.01 level of probability.

⁴0.05 level of probability.

TABLE 5.--Mean number of small bolls¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	1.6	1.4	1.8	2.0	1.0	N.S. ²
	12	5.7	4.8	6.6	4.6	N.S.
	19	8.2	8.7	11.0	7.8	N.S.
	26	9.3 b	13.0 ab	16.6 a	9.6 b	*** ³

TABLE 5.--Mean number of small bolls¹--Continued

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
Aug. 2	6.8	5.6	10.0	11.8	10.3	N.S.
9	16.8	12.4	12.4	16.1	15.3	N.S.
16	7.9 ab	3.6 b	8.0 ab	11.1 a	10.4 a	* ⁴
23	3.8 b	2.2 b	2.7 b	3.8 b	7.0 a	*

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.01 level of probability.

⁴0.05 level of probability.

TABLE 6.--Mean number of large bolls¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	1.0	0.6	0.8	0.4	0.3	N.S. ²
12	3.2 ab	2.8 abc	2.4 bc	3.8 a	1.8 c	* ³
19	7.0	6.4	8.6	7.8	6.8	N.S.
26	10.2	14.6	11.8	17.2	11.1	N.S.
Aug. 2	13.6 b	18.7 b	18.0 b	26.6 a	15.0 b	*
9	24.8	23.9	22.6	34.0	24.0	N.S.
16	21.8 b	21.0 b	20.0 b	38.2 a	23.2 b	** ⁴
23	21.3 bc	17.6 c	22.9 abc	31.4 a	28.1 ab	*

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

⁴0.01 level of probability.

TABLE 7.--Mean number of missing squares¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
June 21	1.6	1.3	1.5	0.8	2.2	N.S. ²
28	2.0 bc	2.8 ab	1.4 c	2.0 bc	3.4 a	* ³
July 6	2.3	1.8	2.9	2.5	2.2	N.S.
12	3.4	2.9	3.0	2.2	4.4	N.S.
19	5.6	4.4	5.4	4.5	6.0	N.S.
26	7.2	7.6	8.4	7.4	10.4	N.S.

TABLE 7.--*Mean number of missing squares*¹--Continued

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
Aug. 2	6.8	6.4	8.9	10.5	10.8	N.S.
9	13.4	13.8	13.3	14.6	12.8	N.S.
16	13.2	13.4	12.6	17.7	17.2	N.S.
23	10.2	13.2	13.2	13.0	17.4	N.S.

¹ Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 8.--*Mean number of missing bolls*¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	1.2	1.0	1.4	0.8	1.2	N.S. ²
12	2.6	2.5	2.2	2.8	2.7	N.S.
19	4.8	3.6	3.4	3.6	4.6	N.S.
26	8.2	6.4	8.4	5.4	8.5	N.S.
Aug. 2	12.0	10.9	16.8	19.0	16.8	N.S.
9	24.5	22.0	23.8	28.8	24.4	N.S.
16	31.2 b	29.0 b	30.0 b	47.2 a	38.4 ab	* ³
23	52.9	29.0	48.4	34.3	38.2	N.S.

¹ Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 9.--*Mean weight, in grams, per plant of stems and roots*¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
May 17	0.12	0.14	0.12	0.12	0.12	N.S. ²
24	.30	.29	.32	.29	.23	N.S.
31	.74	.71	.69	.61	.70	N.S.
June 7	1.50	1.71	1.64	1.56	1.23	N.S.
14	3.59	3.15	3.50	3.14	3.11	N.S.
21	7.54	6.61	7.49	6.55	5.79	N.S.
28	11.21	11.63	11.68	12.62	11.44	N.S.

TABLE 9.--Mean weight, in grams, per plant of stems and roots¹--Continued

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	26.03	20.72	22.83	29.26	19.44	N.S.
	12	31.59	28.69	36.11	27.41	N.S.
	19	39.20	30.60	42.04	41.08	N.S.
	26	41.25	51.37	64.85	56.14	N.S.
Aug. 2	45.83 b	46.01 b	56.04 ab	72.83 a	67.39 a	*3

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 10.--Mean weight, in grams, per plant of leaves¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
May 17	0.20	0.22	0.19	0.18	0.19	N.S. ²
	.47	.45	.50	.43	.37	N.S.
	1.10	1.04	1.04	.87	1.05	N.S.
June 7	1.86	2.02	2.02	1.80	1.62	N.S.
	4.09	3.69	3.91	3.59	3.76	N.S.
	7.20	6.68	7.02	6.62	6.19	N.S.
	9.49	10.34	9.93	10.68	10.28	N.S.
July 6	20.44	16.08	17.93	22.89	15.92	N.S.
	23.45	22.30	20.71	25.72	22.31	N.S.
	30.19	24.37	29.45	31.96	33.79	N.S.
	29.87	36.98	34.06	45.15	37.71	N.S.
Aug. 2	31.58 b	33.33 b	35.44 ab	46.35 a	44.43 a	*3

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 11.--Mean weight, in grams, per plant of squares¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
June 7	0.01	0.01	0	0.01	0	N.S. ²
	.07	.06	.08	.04	.06	N.S.
	.46	.30	.39	.30	.21	N.S.
	.91	.86	1.00	.98	.74	N.S.

TABLE 11.--Mean weight, in grams, per plant of squares¹--Continued

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	2.61	2.47	2.66	3.37	1.91	N.S.
	12	3.03 ab	3.78 a	3.32 ab	4.31 a	2.46 b
	19	3.06	2.69	3.49	3.86	2.95
	26	1.99	2.52	2.89	4.13	N.S.
Aug. 2	1.97	2.29	2.25	3.23	2.61	N.S.
	9	2.70	2.35	1.89	3.53	2.71
	16	.99 b	.54 b	1.18 b	2.10 a	1.22 b
	23	.46	.26	.63	.52	**4
					.90	N.S.

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

⁴0.01 level of probability.

TABLE 12.--Mean weight, in grams, per plant of small bolls¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	0.47	0.46	0.56	0.25	0.26	N.S. ²
	12	1.54	1.54	1.72	1.23	N.S.
	19	2.28	2.33	2.46	2.07	N.S.
	26	2.20 b	3.18 ab	2.58 ab	3.76 a	2.17 b
Aug. 2	1.98	1.40	2.48	2.99	2.34	N.S.
	9	4.41	3.29	2.87	3.86	3.71
	16	2.00	.78	2.17	2.68	3.01
	23	1.06	.56	.59	.93	1.75

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 13.--Mean weight, in grams, per plant of large bolls¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
July 6	0.58	0.21	0.93	0.45	0.11	N.S. ²
	12	3.07 a	2.51 ab	2.47 ab	3.13 a	1.39 b
	19	7.88	7.19	8.91	6.73	7.31
	26	16.84	22.88	17.01	22.71	16.29

TABLE 13.--*Mean weight, in grams, per plant of large bolls*¹--Continued

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
Aug. 2	30.15 b	39.19 ab	38.19 ab	52.61 a	29.21 b	*
9	64.19	64.47	55.38	74.07	57.83	N.S.
16	71.16	72.98	61.66	104.79	75.32	N.S.
23	74.06	67.30	81.26	96.57	92.00	N.S.

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

TABLE 14.--*Mean weight, in grams, per plant of open bolls*¹

Sampling date	Entry					Statistical significance
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61	
Aug. 16	0.50	1.99	0.58	0.95	0.78	N.S. ²
23	5.55	6.77	8.12	4.25	6.93	N.S.

¹Means of 4 replications, 5 plants per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

TABLE 15.--*Average boll weight, in grams, after flowering*¹

Days after flowering	Entry				
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61
14	1.9	1.8	1.8	1.8	1.8
16	2.0	2.1	1.9	2.1	2.0
23	3.0	2.9	3.0	2.9	3.0
26	3.8	3.7	3.7	3.5	3.8
30	4.2	4.2	4.0	3.8	4.1
34	5.2	4.9	4.9	4.6	5.2
38	5.2	5.5	5.5	5.3	5.1
41	6.4	6.3	6.5	5.8	6.1
43	6.4	6.4	6.2	6.2	5.8

¹No statistically significant differences.

TABLE 16.--Mean total, bur, raw, seed, and lint weight, in grams¹

Weight	Entry				
	DPL-16	St 213	DPL-7146N	St 731N	DPL-61
Total	176.7 a	172.4 a	170.4 ab	161.5 c	164.5 bc
Bur	33.4 ab	34.8 a	32.1 b	33.3 ab	31.7 b
Raw	142.9 a	137.2 ab	137.4 ab	127.4 c	132.2 bc
Seed	88.0 a	83.7 b	82.9 b	75.3 c	80.7 b
Lint	53.5 a	52.1 ab	53.4 a	50.6 b	50.2 b

¹Means of 3 replications, 25 bolls per replication. Means within a row not followed by the same letter are significantly different at the 0.05 level of probability.

TABLE 17.--Mean number of cotton bolls harvested¹

Harvest date	Entry					Statistical Significance
	DPL 16	St 213	DPL-7146N	St 731N	DPL 61	
Aug.	2.5	1.5	1.5	0	2.0	N.S. ²
	12.3	12.8	14.3	13.0	8.8	N.S.
	32.0 b	48.3 a	31.3 b	25.8 b	19.0 b	* ³
Sept.	67.3 b	122.8 a	79.5 b	91.0 b	71.3 b	*
	130.8 ab	164.3 a	146.5 a	146.3 a	110.5 b	*
	134.3 ab	99.5 b	132.5 ab	149.3 a	124.5 ab	** ⁴
	53.0	37.0	52.5	44.5	52.3	N.S.
Oct.	50.0 abc	28.3 c	40.0 bc	69.0 a	57.3 ab	*
Total	482.0 ab	514.3 a	498.0 ab	538.8 a	445.5 b	*

¹Means of 4 replications, 4 m of row per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

⁴0.01 level of probability.

TABLE 18.--*Mean weight, in grams, of harvested seed cotton*¹

Harvest date	Entry					Statistical Significance
	DPL 16	St 213	DPL-7146N	St 731N	DPL 61	
Aug.	9.8	7.1	6.4	0	7.0	N.S. ²
	55.5	55.9	65.3	39.4	36.9	N.S.
	127.8 ab	184.2 a	118.0 b	99.0 b	69.3 b	* ³
Sept.	279.5 b	555.9 a	329.3 b	379.6 b	305.6 b	*
	593.9 ab	756.7 a	690.3 a	639.9 ab	512.0 b	** ⁴
	606.0 a	381.4 b	559.8 a	572.8 a	525.7 ab	**
	185.1	115.7	172.9	157.7	174.3	N.S.
Oct.	146.9 ab	86.7 b	120.8 b	208.8 a	155.0 ab	**
Total	2004.4 ab	2143.5 a	2062.8 a	2097.1 a	1785.7 b	*

¹Means of 4 replications, 4 m of row per replication. Means within a row not followed by the same letter are significantly different.

²No statistically significant differences.

³0.05 level of probability.

⁴0.01 level of probability.

TABLE 19.--Maximum and minimum temperatures, relative humidity, windspeed, number of langleys, and amount of rain or irrigation

	DAY	TMX	TMN	HU	WND	LAN	H2O		DAY	TMX	TMN	HU	WND	LAN	H2O
COTTON-RES-CNTR-1976--0	1	52	25					COTTON-RES-CNTP-1976--054	75	42					
COTTON-PFS-CNTP-1976--0	2	53	25					COTTON-PES-CNTR-1976--055	71	43					
COTTON-RES-CNTR-1976--0	3	50	28					COTTON-PES-CNTP-1976--056	76	37					
COTTON-PES-CNTP-1976--0	4	61	34					COTTON-PFS-CNTP-1976--057	81	42					
COTTON-PES-CNTP-1976--0	5	63	32					COTTON-RES-CNTR-1976--058	82	45					
COTTON-RES-CNTP-1976--0	6	61	33					COTTON-RES-CNTR-1976--059	80	45					
COTTON-RFS-CNTR-1976--0	7	60	33					COTTON-RES-CNTR-1976--060	82	46					
COTTON-RES-CNTP-1976--0	8	66	34					COTTON-RES-CNTR-1976--061	72	62					
COTTON-RES-CNTP-1976--0	9	67	40					COTTON-PES-CNTR-1976--062	70	54					
COTTON-PES-CNTP-1976--010	66	37						COTTON-PES-CNTP-1976--063	59	39					
COTTON-RES-CNTR-1976--011	69	35						COTTON-RES-CNTR-1976--064	55	34					
COTTON-RES-CNTP-1976--012	68	34						COTTON-RES-CNTR-1976--065	63	38					
COTTON-PES-CNTR-1976--013	71	36						COTTON-RES-CNTP-1976--066	62	42					
COTTON-PFS-CNTR-1976--014	78	39						COTTON-RES-CNTR-1976--067	70	44					
COTTON-PES-CNTP-1976--015	77	40						COTTON-RES-CNTP-1976--068	69	42					
COTTON-RFS-CNTR-1976--016	82	44						COTTON-PES-CNTP-1976--069	74	42					
COTTON-RES-CNTR-1976--017	82	46						IASUFARM, TEMRE, AZ1976-070	67	39	40				
COTTON-PES-CNTR-1976--018	75	46						IASUFARM, TEMRE, AZ1976-071	65	37	40				
COTTON-RES-CNTR-1976--019	72	49						IASUFARM, TEMRE, AZ1976-072	63	35	35				
COTTON-RES-CNTR-1976--020	72	52						IASUFARM, TEMPE, AZ1976-073	68	36	20				
COTTON-PES-CNTR-1976--021	70	51						IASUFARM, TEMRE, AZ1976-074	76	36	25				
COTTON-RES-CNTP-1976--022	74	56						IASUFARM, TEMRE, AZ1976-075	78	41	25				
COTTON-PES-CNTR-1976--023	72	50						IASUFARM, TEMRE, AZ1976-076	79	44	18				
COTTON-RES-CNTP-1976--024	68	44						IASUFARM, TEMPE, AZ1976-077	74	42	55				
COTTON-RES-CNTR-1976--025	67	40						IASUFARM, TEMRE, AZ1976-078	72	43	20				
COTTON-RES-CNTR-1976--026	66	37						IASUFARM, TEMPE, AZ1976-079	76	38	30				
COTTON-RES-CNTR-1976--027	72	37						IASUFARM, TEMPE, AZ1976-080	73	35	25				
COTTON-PES-CNTR-1976--028	75	40						IASUFARM, TEMPE, AZ1976-081	82	44	15				
COTTON-PES-CNTR-1976--029	78	43						IASUFARM, TEMPE, AZ1976-082	90	46	15				
COTTON-RES-CNTR-1976--030	78	43						IASUFARM, TEMRE, AZ1976-083	85	42	30				
COTTON-PES-CNTR-1976--031	80	42						IASUFARM, TEMPE, AZ1976-084	84	41	25				
COTTON-PES-CNTR-1976--032	79	45						IASUFARM, TEMPE, AZ1976-085	80	43	30				
COTTON-RES-CNTP-1976--033	81	43						IASUFARM, TEMRE, AZ1976-086	74	38	20				
COTTON-PES-CNTR-1976--034	74	53						IASUFARM, TEMPE, AZ1976-087	74	46	30				
COTTON-PES-CNTR-1976--035	65	54						IASUFARM, TEMRE, AZ1976-088	69	47	30				
COTTON-PFS-CNTR-1976--036	65	56						IASUFARM, TEMRE, AZ1976-089	65	40	25				
COTTON-PES-CNTR-1976--037	70	53						IASUFARM, TEMPE, AZ1976-090	72	37	25				
COTTON-RFS-CNTP-1976--038	77	54						IASUFARM, TEMRE, AZ1976-091	82	38	25				
COTTON-RES-CNTR-1976--039	69	55						IASUFARM, TEMPE, AZ1976-092	84	42	25				
COTTON-RES-CNTR-1976--040	70	59						IASUFARM, TEMPE, AZ1976-093	86	43	25				
COTTON-RFS-CNTP-1976--041	66	50						IASUFARM, TEMRE, AZ1976-094	83	44	25				
COTTON-PES-CNTR-1976--042	70	45						IASUFARM, TEMRE, AZ1976-095	83	42	30				
COTTON-RES-CNTP-1976--043	74	54						IASUFARM, TEMRE, AZ1976-096	68	38	40				
COTTON-PES-CNTP-1976--044	68	50						IASUFARM, TEMPE, AZ1976-097	74	41	35				
COTTON-PES-CNTP-1976--045	67	50						IASUFARM, TEMPE, AZ1976-098	81	46	28				
COTTON-PES-CNTP-1976--046	67	48						IASUFARM, TEMPF, AZ1976-099	86	46	20				
COTTON-PFS-CNTR-1976--047	70	46						IASUFARM, TFMR, AZ1976-100	78	43	35				
COTTON-RES-CNTP-1976--048	70	43						IASUFARM, TEMPE, AZ1976-101	82	43	30				
COTTON-PES-CNTP-1976--049	73	44						IASUFARM, TEMPE, AZ1976-102	88	44	25				
COTTON-PES-CNTP-1976--050	77	44						IASUFARM, TEMRE, AZ1976-103	78	52	35				
COTTON-PES-CNTP-1976--051	66	43						IASUFARM, TEMRE, AZ1976-104	70	50	50				
COTTON-PES-CNTP-1976--052	67	39						IASUFARM, TEMPE, AZ1976-105	60	44	60				
COTTON-PES-CNTP-1976--053	74	46						IASUFARM, TEMPE, AZ1976-106	63	40	45				
								IASUFARM, TEMPE, AZ1976-107	56	38	55				
								IASUFARM, TEMRE, AZ1976-108	62	38	35				

TABLE 19.--Maximum and minimum temperatures, relative humidity, windspeed, number of langleys, and amount of rain or irrigation--Continued

	DAY	TMX	TMN	HU	WND	LAN	H20		DAY	TMX	TMN	HU	WND	LAN	H20
1ASUFARM,TEMPE,AZ1976-109	68	44	35					3ASUFARM,TEMPE,AZ1976-162	90	56	24	151	726		
1ASUFARM,TEMPE,AZ1976-110	76	44	35					3ASUFARM,TEMRE,AZ1976-163	88	53	22	57	733		
1ASUFARM,TEMPE,AZ1976-111	83	49	28					3ASUFARM,TEMPE,AZ1976-164	95	55	17	57	740		
1ASUFARM,TEMPE,AZ1976-112	88	48	35					3ASUFARM,TEMPE,AZ1976-165	99	56	17	57	735		
1ASUFARM,TEMPE,AZ1976-113	86	47	28					3ASUFARM,TEMPE,AZ1976-166	99	58	20	69	714		
1ASUFARM,TEMPE,AZ1976-114	85	48	30					3ASUFARM,TEMRE,AZ1976-167	102	58	17	66	725		
1ASUFARM,TEMPE,AZ1976-115	90	49	25					3ASUFARM,TEMRE,AZ1976-168	104	62	16	85	740		
1ASUFARM,TEMPE,AZ1976-116	90	50	25					3ASUFARM,TEMPE,AZ1976-169	102	62	20	97	736		
1ASUFARM,TEMPE,AZ1976-117	80	46	30					3ASUFARM,TEMPE,AZ1976-170	103	65	22	63	715		
1ASUFARM,TEMPE,AZ1976-118	84	45	30					3ASUFARM,TEMPE,AZ1976-171	108	66	18	63	720		
1ASUFARM,TEMPE,AZ1976-119	85	49	25					3ASUFARM,TEMPE,AZ1976-172	110	75	18	63	665		
1ASUFARM,TEMPE,AZ1976-120	86	48	25					3ASUFARM,TEMPE,AZ1976-173	109	71	18	58	691		
1ASUFARM,TEMPE,AZ1976-121	94	55	25					3ASUFARM,TEMPE,AZ1976-174	99	60	20	119	706	5.50	
1ASUFARM,TEMRE,AZ1976-122	92	51	20					3ASUFARM,TEMPE,AZ1976-175	98	62	22	52	720		
1ASUFARM,TEMPE,AZ1976-123	96	53	18					3ASUFARM,TEMPE,AZ1976-176	102	61	22	54	737		
1ASUFARM,TEMPE,AZ1976-124	95	59	30					3ASUFARM,TEMRE,AZ1976-177	103	60	22	56	740		
1ASUFARM,TEMPE,AZ1976-125	80	54	80					3ASUFARM,TEMPE,AZ1976-178	110	62	16	72	735		
1ASUFARM,TEMPE,AZ1976-126	77	55	35					3ASUFARM,TEMPE,AZ1976-179	112	74	20	75	715		
1ASUFARM,TEMPE,AZ1976-127	81	50	32					3ASUFARM,TEMPE,AZ1976-180	110	80	21	138	678		
1ASUFARM,TEMPE,AZ1976-128	76	57	38					3ASUFARM,TEMPE,AZ1976-181	106	76	26	92	701		
1ASUFARM,TEMPE,AZ1976-129	76	51	40					3ASUFARM,TEMPE,AZ1976-182	105	74	27	97	690		
1ASUFARM,TEMRE,AZ1976-130	85	54	30					3ASUFARM,TEMRE,AZ1976-183	106	69	24	79	702		
3ASUFARM,TEMPE,AZ1976-131	96	58	15	52	6R3			3ASUFARM,TEMPE,AZ1976-184	104	66	19	81	729		
3ASUFARM,TEMRE,AZ1976-132	98	58	15	44	687			3ASUFARM,TEMPE,AZ1976-185	102	68	19	59	724		
3ASUFARM,TEMPE,AZ1976-133	101	60	16	97	681			3ASUFARM,TEMPE,AZ1976-186	107	71	20	81	699		
3ASUFARM,TEMPE,AZ1976-134	100	57	13	49	713			3ASUFARM,TEMPE,AZ1976-187	107	72	23	70	650		
3ASUFARM,TEMPE,AZ1976-135	104	58	15	61	710			3ASUFARM,TEMPE,AZ1976-188	108	78	23	76	694		
3ASUFARM,TEMPE,AZ1976-136	102	58	15	65	702			3ASUFARM,TEMPE,AZ1976-189	109	76	25	77	669		
3ASUFARM,TEMPE,AZ1976-137	100	62	16	86	694			3ASUFARM,TEMRE,AZ1976-190	108	78	24	71	672		
3ASUFARM,TEMPE,AZ1976-138	98	68	20	82	691	.06		3ASUFARM,TEMRE,AZ1976-191	106	80	28	106	629	4.75	
3ASUFARM,TEMPE,AZ1976-139	98	66	22	117	591	.06		3ASUFARM,TEMRE,AZ1976-192	102	77	30	94	653		
3ASUFARM,TEMPE,AZ1976-140	87	66	31	117	276			3ASUFARM,TEMPE,AZ1976-193	100	75	30	92	660		
3ASUFARM,TEMPE,AZ1976-141	95	62	20	69	563			3ASUFARM,TEMPE,AZ1976-194	92	74	38	77	561		
3ASUFARM,TEMPE,AZ1976-142	97	55	16	69	693			3ASUFARM,TEMPE,AZ1976-195	97	74	27	54	604		
3ASUFARM,TEMPE,AZ1976-143	95	52	14	69	721			3ASUFARM,TEMPE,AZ1976-196	100	72	25	73	667		
3ASUFARM,TEMPE,AZ1976-144	97	54	14	69	690			3ASUFARM,TEMPE,AZ1976-197	102	74	23	84	678		
3ASUFARM,TEMRE,AZ1976-145	95	53	15	107	727			3ASUFARM,TEMPE,AZ1976-198	100	74	24	85	624		
3ASUFARM,TEMPE,AZ1976-146	90	54	16	60	709			3ASUFARM,TEMPE,AZ1976-199	96	78	27	73	491		
3ASUFARM,TEMPE,AZ1976-147	99	59	16	60	698			3ASUFARM,TEMPE,AZ1976-200	95	78	36	85	524		
3ASUFARM,TEMPE,AZ1976-148	104	60	15	55	696			3ASUFARM,TEMPE,AZ1976-201	99	72	27	50	669		
3ASUFARM,TEMPE,AZ1976-149	100	58	15	85	728			3ASUFARM,TEMPE,AZ1976-202	101	72	27	58	662		
3ASUFARM,TEMPE,AZ1976-151	90	56	20	85	715			3ASUFARM,TEMPE,AZ1976-203	96	75	26	62	550		
3ASUFARM,TEMPE,AZ1976-152	97	56	17	68	723			3ASUFARM,TEMPE,AZ1976-204	97	70	34	85	665	5.02	
3ASUFARM,TEMPE,AZ1976-153	102	57	14	51	719	6.25		3ASUFARM,TEMPE,AZ1976-205	96	71	28	105	645		
3ASUFARM,TEMPE,AZ1976-154	102	57	14	89	723			3ASUFARM,TEMPE,AZ1976-206	95	72	28	80	640	.28	
3ASUFARM,TEMPE,AZ1976-155	98	58	17	66	738			3ASUFARM,TEMPE,AZ1976-207	95	72	30	63	505		
3ASUFARM,TEMPE,AZ1976-156	97	57	18	68	706			3ASUFARM,TEMPE,AZ1976-208	96	71	31	66	611		
3ASUFARM,TEMPE,AZ1976-157	97	60	18	68	653			3ASUFARM,TEMPE,AZ1976-209	97	73	28	72	597		
3ASUFARM,TEMPE,AZ1976-158	101	58	17	68	729			3ASUFARM,TEMPE,AZ1976-210	97	72	31	72	553	.03	
3ASUFARM,TEMRE,AZ1976-159	100	58	18	96	707			3ASUFARM,TEMPE,AZ1976-211	91	76	37	106	548		
3ASUFARM,TEMPE,AZ1976-160	98	63	19	70	719			3ASUFARM,TEMPE,AZ1976-212	93	70	33	92	483		
3ASUFARM,TEMPE,AZ1976-161	100	60	22	91	727			3ASUFARM,TEMPE,AZ1976-213	95	67	30	48	579		
								3ASUFARM,TEMPE,AZ1976-214	98	64	26	48	659		
								3ASUFARM,TEMPE,AZ1976-215	100	65	20	48	665		
								3ASUFARM,TEMPE,AZ1976-216	98	60	20	91	683		

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